

## 学位論文要旨 Dissertation Abstract

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学位論文題目 : Studies on *in vitro* organogenesis of an *Oncidium* cultivar  
Title of Dissertation (オンシジウムの*in vitro*における器官形成に関する研究)

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Dissertation Abstract

Orchidaceae family is one of the largest and most diverse plant family producing beautiful flowers and exhibiting more than 25000 species and 700-800 genera. Among this huge number of species *Oncidium* sp. (commonly known as dancing lady) is a tropical epiphytic orchid comprising over 750 species. Plant organogenesis *in vitro* condition is a very reliable process. Studies on *in vitro* organogenesis of an *Oncidium* cultivar was conducted to explore new methodologies of organogenesis.

Chapter I: The effect of light quality on the growth of PLBs was investigated. After six weeks of PLBs culture in the modified MS medium, the results indicated that blue LED was better in PLB proliferation and red LED increased the shoots. The maximum fresh weight was found under red LED. Trehalose was used as an alternative source of carbohydrate whereas 5g/l trehalose combined with 15g/l sucrose was found as best. White LED increased PLBs using 5g/l trehalose and 15g/l sucrose.

Chapter II: Under this section we cultured PLBs with auxin ( $\alpha$ -Naphthaleneacetic Acid potassium salt) (NAA-K) and cytokinins (Thidiazuron and 6-Benzyleaminopurine) (TDZ and BAP) at various concentrations added to modified MS medium to understand their effect on PLB proliferation. In the case of NAA-K, findings indicated that 0.1mg/l was found to be the best concentration in terms of

PLB, shoot proliferation and fresh weight. PLBs cultured with TDZ, the best response was found with 0.1mg/l. Another experiment was conducted with another type cytokinin (BAP) at various concentrations to understand their effect under different LEDs. The findings revealed that the highest number of PLBs found with 0.1mg/l BAP whereas other concentrations were statistically similar. Considering the findings of the previous experiment with BAP concentrations, 0.1mg/l BAP was found to be as the best while using this concentrations PLBs were cultured under different light conditions. The findings of this experiment indicated that white LED was found to be best among the other light sources in terms of PLB and shoot proliferation as well as increasing the fresh weight.

Chapter III: In this section PLB and shoots were cultured with polythelene glycol (PEG) at various concentrations added to MS modified medium to understand their effect. When PLBs were used as explants, the findings indicated that except control (0mg/l) other concentrations were statistically similar in PLB proliferation whereas the highest number of shoots (2.0/explant) was found 0.01mg/l PEG. In the case of shoots as explants, the highest number of PLBs (25.1/explant) compared to control whereas no significant variation was found in shoot proliferation. The maximum fresh weight (324.0mg) was found with 0.1mg/l compared with control. Another experiment was conducted with different concentrations of two types of alginate (IL-2 and ULV-L3) to understand their effect on proliferation. In the case of both types of alginate, the maximum fresh weight was found with 0.1mg/l.

Chapter IV: Experiments were conducted using 5-Aminolevulenic acid (5-ALA) and N-Acetylcysteine (NAG) at various concentrations added to MS medium to understand their effect under different LEDs. Among various concentrations, 0.1mg/l of 5-ALA increased number of PLBs, shoots and fresh weight under white LED. Similarly, 0.1mg/l NAG increased number of PLBs, shoots and fresh weight under white LED.

Chapter V: Under this section we tried to conduct experiments where PLBs were treated with different types of hyaluronic acids (HA9, HA12 and HA20). In the case of HA12 and HA20, 0.1mg/l concentration was considered as the best in proliferating the PLBs. Another experiment was conducted to understand the effect of HA9 at various concentrations added to modified MS medium under different LEDs whereas 0.1mg/l was found as the best concentration compared to control. Using this concentration PLBs were cultured under different light condition. Blue LED was found effective in terms of PLB proliferation. The best response regarding in terms of shoot proliferation with white LED and green LED increased fresh weight.